DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a) because they fail to show the label names on Figs. 1-6 as described in the specification, i.e., Fig. 1, element 1 should be labeled as “Optical Disc Drive”, Fig. 1, element 2 should be labeled as “Disc”, Fig. 1, element 4 should be labeled as “Motor”, Fig. 1, element 5 should be labeled as “Rotation Axis”, Fig. 1, element 11 should be labeled as “Radial Actuator”, Fig. 1, element 12 should be labeled as “Focus Actuator”, Fig. 1, element 30 should be labeled as “Optical System”, Fig. 1, element 31 should be labeled as “Light Beam generating Means”, Fig. 1, element 32A-B should be labeled as “Light beam”, Fig. 1, element 32C should be labeled as “Reflected Light Beam”, Fig. 1, element 33 should be labeled as “Beam Splitter”, Fig. 1, element 34 should be labeled as “Objective Lens”, Fig. 1, element 35 should be labeled as “Optical Detector”, Fig. 1, element 90 should be labeled as “Control Unit”, Fig. 1, elements 90A-C should be labeled as “1st, 2nd, and 3rd outputs”, Fig. 1, element 90D should be labeled as “Read Signal Output”, Fig. 1, elements S_{CM}, S_{CR}, S_{CF} should be labeled as “Control Signal”.

Note: The correction should be applied to <u>all</u> Figures. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures

appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3, 8-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Kojima (Patent No. 6118613).

Claim 1 (original), Method for driving an actuator, the method comprising the step of suitably amending the electrical damping of the actuator (see Figs. 5 and 6; Col. 11, line 18-Col. 12, line 67. When the negative resistance circuit is short-circuited and/or selecting the resistance value R_n of the negative resistance circuit, the damping of the actuator can be realized. Therefore, the electrical damping of the actuator is and/or can be amended, see Col. 12, lines 47-56).

Claim 2 (original), Method according to claim 1,

wherein the electrical damping of the actuator is amended by amending the electrical resistance of an actuator drive loop (Col. 11, line 18-Col. 12, line 67. The electrical damping of the actuator is amended when the negative resistance circuit connecting the actuator is short-circuited).

Claim 3 (original), Method according to claim 2,

wherein the electrical resistance of the actuator drive loop (Fig. 5, element 1) is amended by switching in or out an electrical damping element, i.e., negative resistance circuit, providing a negative resistance, i.e., see equation 17 (Col. 11, line 18-Col. 12. A negative resistance is provided from the negative resistance circuit via short-circuit, i.e., switching out of an electrical damping element is considered as circuit being open, thereby short-circuiting. Also, when $R_n < R_c$ negative resistance is provided).

Claim 8 (original), Actuator driver circuit having a negative internal resistance (see Fig. 5, element 100 comprises a signal source and current source circuits connected to a negative resistance circuit. Therefore, there is a negative internal resistance in the actuator driver circuit, i.e., drive circuit).

Claim 9 (original), Actuator driver circuit (Fig. 5, element 100) comprising a drive signal source (Fig. 5, element 5) and an electrical damping element (Fig. 5, element 36) having a negative resistance connected in series with the drive signal source. (Fig. 5, element 100. Negative resistance circuit 36, is connected in series with the signal source 5).

Claim 10 (original), Actuator driver circuit (Fig. 5, element 100) according to claim 9, comprising controllable means, i.e., feedback control means, for selectively switching said electrical damping element into or out of a signal path (Col. 4, line 40-Col. 5, line 59. When a circuit is shorted, said electrical damping element, i.e., negative resistance circuit, has been switched out of a signal path) from a drive signal source output (Fig. 5, element 5) to a driver circuit output (Fig. 5, element 100).

Claim 11 (currently amended), Actuator driver circuit (Fig. 5, element 100) according to claim 9 comprising controllable means, i.e., feedback control means, for selectively switching components of said electrical damping element into or out of operation in order to adjust damping properties of the electrical damping element (Col.

11, line 49-Col. 12, line 67. When a circuit is shorted, said electrical damping element, i.e., negative resistance circuit, has been switched out of operation if the capacitor of the impedance circuit, within the electrical damping element, is considered open).

Claim 12 (original), Actuator assembly comprising an actuator (Fig. 5, element 1), a drive signal source (Fig. 5, element 5), and an electrical damping element (Fig. 5, element 36) having a negative resistance connected in series with the drive signal source and the actuator (see Fig. 5, elements 100 and 1).

Claim 13 (original), Actuator assembly (Fig. 5 equates to an actuator assembly since it comprises a drive signal source, a negative resistance circuit, and an actuator) according to claim 12, further comprising controllable means, i.e., feedback control means, for selectively switching said electrical damping element into or out of a signal path (Col. 4, line 40-Col. 5, line 59. When a circuit is shorted, said electrical damping element, i.e., negative resistance circuit, has been switched out of a signal path) between the drive signal source (Fig. 5, element 5) and the actuator (Fig. 5, element 1).

Claim 14 (currently amended), Actuator assembly (Fig. 5 equates to an actuator assembly since it comprises a drive signal source, a negative resistance circuit, and an actuator) according to claim 12 further comprising controllable means, i.e., feedback control means, for selectively switching components of said electrical damping element into or out of operation in order to adjust damping properties of the electrical damping

element (Col. 11, line 49-Col. 12, line 67. When a circuit is shorted, said electrical damping element, i.e., negative resistance circuit, has been switched out of operation if the capacitor of the impedance circuit, within the electrical damping element, is considered open).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kojima (Patent No. 6118613) in view of Enomoto (Patent No. 4783774).

Claim 15 (currently amended), Kojima discloses an actuator driver circuit as discussed in claim 8.

Kojima does not disclose disc drive apparatus for reading or writing a disc,

a pickup element and at least one actuator for manipulating the pickup element; and

wherein the disc drive apparatus comprises an actuator driver circuit according to claim 8.

Enomoto discloses a disc drive apparatus, i.e., optical information reproducing apparatus, for reading or writing a disc (Col. 5, lines 10-49),

a pickup element (Fig. 4, element 13) and at least one actuator (Fig. 4, element 13h) for manipulating the pickup element (Col. 7, lines 49-59),

wherein the disc drive apparatus (i.e., optical information reproducing apparatus) comprises an actuator driver circuit (Fig. 4, element 16; Col. 7, lines 49-59).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kojima with the teachings Enomoto by disclosing a disc drive apparatus comprising an actuator driver circuit and a pickup element, so, to improve on the efficiency at driving the load, i.e., pickup drive motor, by a pulse width modulation signal, in respect of the conversion efficiency from electric energy to kinetic energy (Enomoto; Col. 2, line 67-Col. 3, line 2).

Claim 16 (original), Kojima in view of Enomoto further discloses the disc drive apparatus (i.e., optical information reproducing apparatus),

wherein said pickup element (Fig. 5, element 13) is an objective lens (Fig. 5, element 13f) of an optical system far scanning tracks of an optical disc (Col. 7, lines 20-59. The objective lens is provided in the optical pickup, therefore, the optical pickup is an objective lens).

6. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kojima (Patent No. 6118613) in view of Enomoto (Patent No. 4783774) and further in view of Hammond et al (Patent No. 5635848).

Claim 5 (currently amended), Kojima discloses the method of driving an actuator as discussed in claim 1.

Kojima does not disclose an optical disc drive for radially driving an objective lens radial actuator,

wherein the electrical damping of the radial actuator is increased when a radial error signal indicates a radial error exceeding a predefined threshold, or when the radial error signal becomes absent; and

wherein the electrical damping of the radial actuator is decreased to the normal damping when the radial error signal indicates said radial error decreasing below said predefined threshold, or when the radial error signal returns, respectively.

Enomoto discloses optical disc drive (Col. 5, lines 10-12; i.e., optical information reproducing apparatus), for radially driving an objective lens focus actuator (Col. 7, lines 33-59).

Therefore, it would have been obvious to one of ordinary skill in the art to modify Kojima with the teachings of Enomoto, i.e., to disclose an optical disc drive for radially driving an objective lens focus actuator, so, to achieve higher efficiency of a power conversion from electric energy to kinetic energy when pulse width modulation technique is a applied (Enomoto; Col. 2, lines 53-58).

Kojima in view of Enomoto does not disclose

wherein the electrical damping of the radial actuator is increased when a radial error signal indicates a radial error exceeding a predefined threshold, or when the radial error signal becomes absent; and

wherein the electrical damping of the radial actuator is decreased to the normal damping when the radial error signal indicates said radial error decreasing below said predefined threshold, or when the radial error signal returns, respectively

Hammond discloses position error X_{err}, of actuator, i.e., radial error greater than a reference value, X_{err}, i.e., predefined threshold (Col. 9, lines 3-24), and

position error X_{err}, of actuator, i.e., radial error less than a reference value, X_{err}, i.e., predefined threshold (Col. 9, lines 3-24).

Therefore, it would have been obvious to one of ordinary skill in the art to modify Kojima in view of Enomoto with the teachings of Hammond by disclosing electrical damping of the focus actuator being increased when a focus error signal exceeds a predefined threshold and electrical damping of the focus actuator being decreased when the focus error signal decreases below said predefined threshold, so, to control the speed at which the probe is actuated as well as the motion characteristics of the actuator in an open loop system, thereby preventing damage to the surface and a worst-case allowance for settling time because the actual position of probe is not known. Moreover, in a close loop system, avoiding high-frequency scraping of surface while the system oscillates to make positional corrections (Hammond; Col. 1, line 61-Col. 2, line13).

Claim 6 (currently amended), Kojima discloses the method of driving an actuator as discussed in claim 1.

Kojima does not disclose an optical disc drive for axially driving an objective lens focus actuator,

wherein the electrical damping of the focus actuator is increased when a focus error signal indicates a focus error exceeding a predefined threshold, or when the focus error signal becomes absent; and

wherein the electrical damping of the focus actuator is decreased to the normal damping when the focus error signal indicates said focus error decreasing below said predefined threshold, or when the focus error signal returns, respectively.

Enomoto discloses optical disc drive (Col. 5, lines 10-12; i.e., optical information reproducing apparatus), for axially driving an objective lens focus actuator (Col. 7, lines 33-59).

Therefore, it would have been obvious to one of ordinary skill in the art to modify Kojima with the teachings of Enomoto, i.e., to disclose an optical disc drive for axially driving an objective lens focus actuator, so, to achieve higher efficiency of a power conversion from electric energy to kinetic energy when pulse width modulation technique is a applied (Enomoto; Col. 2, lines 53-58).

Kojima in view of Enomoto does not disclose

wherein the electrical damping of the focus actuator is increased when a focus error signal indicates a focus error exceeding a predefined threshold, or when the focus error signal becomes absent; and

wherein the electrical damping of the focus actuator is decreased to the normal damping when the focus error signal indicates said focus error decreasing below said predefined threshold, or when the focus error signal returns, respectively.

Hammond discloses position error X_{err}, of actuator, i.e., focus error greater than a reference value, X_{err}, i.e., predefined threshold (Col. 9, lines 3-24), and

position error X_{err}, of actuator, i.e., focus error less than a reference value, X_{err}, i.e., predefined threshold (Col. 9, lines 3-24).

Therefore, it would have been obvious to one of ordinary skill in the art to modify Kojima in view of Enomoto with the teachings of Hammond by disclosing electrical damping of the focus actuator being increased when a focus error signal exceeds a predefined threshold and electrical damping of the focus actuator being decreased when the focus error signal decreases below said predefined threshold, so, to control the speed at which the probe is actuated as well as the motion characteristics of the actuator in an open loop system, thereby preventing damage to the surface and a worst-case allowance for settling time because the actual position of probe is not known. And in a close loop system, avoiding high-frequency scraping of surface while the system oscillates to make positional corrections (Hammond; Col. 1, line 61-Col. 2, line13).

Claim 7 (currently amended), Kojima discloses the method of driving an actuator as discussed in claim 1.

Kojima does not disclose an optical disc drive for radially driving an objective lens radial actuator or for axially driving an objective lens focus actuator,

wherein the electrical damping of the actuator is increased in response to a command indicating a jump to another track, or during a power-up phase, and

wherein the electrical damping of the actuator is decreased to the normal damping when the new target track has been reached or when the power-up phase has ended, respectively.

Enomoto discloses optical disc drive (Col. 5, lines 10-12; i.e., optical information reproducing apparatus), for radially driving an objective lens focus actuator (Col. 7, lines 33-59) and

a command indicating a track jump (Col. 8, lines 18-43)

Therefore, it would have been obvious to one of ordinary skill in the art to modify Kojima with the teachings of Enomoto, i.e., to disclose an optical disc drive for radially driving an objective lens focus actuator and a command indicating track jump, so, to achieve higher efficiency of a power conversion from electric energy to kinetic energy when pulse width modulation technique is a applied (Enomoto; Col. 2, lines 53-58).

Kojima in view of Enomoto does not disclose wherein the electrical damping of the actuator is increased and

wherein the electrical damping of the actuator is decreased

Hammond discloses wherein the electrical damping of the actuator is increased and wherein the electrical damping of the actuator is decreased (Col. 9, lines 3-25. When the position error of the actuator, i.e., focus error, is greater than the reference

value, i.e. threshold, then, the electrical damping of actuator is increased and vice-versa).

Therefore, it would have been obvious to one of ordinary skill in the art to modify Kojima in view of Enomoto with the teachings of Hammond by disclosing electrical damping of the focus actuator being increased in response to a command indicating a jump to another track when a focus error signal exceeds a predefined threshold and electrical damping of the focus actuator being decreased to the normal damping when the new target track has been reached, i.e., the focus error signal decreases below said predefined threshold, so, to control the speed at which the probe is actuated as well as the motion characteristics of the actuator in an open loop system, thereby preventing damage to the surface and a worst-case allowance for settling time because the actual position of probe is not known. Moreover, in a close loop system, avoiding high frequency scraping of surface while the system oscillates to make positional corrections (Hammond; Col. 1, line 61-Col. 2, line13).

7. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kojima (Patent No. 6118613) in view of Hammond et al (Patent No. 5635848).

Claim 4 (currently amended) Kojima discloses the method driving an actuator as discussed in claim 1,

wherein the electrical damping of the actuator (Fig. 5, elements 100 and 1) deviates from a target position and wherein the electrical damping of the actuator has

recovered the target position (Col. 11, line 18-Col. 13 line 7. When a circuit is shorted, i.e., Open, a target position or path has been deviated to another position or path. And when the circuit is not in a shorted state, i.e., Closed, or it is un-shorted, then it has recovered the target position).

Kojima does not disclose wherein the electrical damping of the actuator is increased or decreased.

Hammond discloses wherein the electrical damping of the actuator is increased or decreased (Col. 9, lines 3-24. When the position error of the actuator, i.e. focus error, is greater than the reference value error, i.e., threshold, then, the electrical damping of actuator is increased and vice-versa).

Therefore, it would have been obvious to one of ordinary skill in the art to modify Kojima with the teachings of Hammond by disclosing wherein the electrical damping of the actuator is increased with respect to the damping during normal operative conditions when an actuator position deviates from a target position, and wherein the electrical damping of the actuator is decreased to the normal damping when the actuator has recovered the target position, so, to control the speed at which the probe is actuated as well as the motion characteristics of the actuator in an open loop system, thereby preventing damage to the surface and a worst-case allowance for settling time because the actual position of probe is not known. Moreover, in a close loop system, avoiding high frequency scraping of surface while the system oscillates to make positional corrections (Hammond; Col. 1, line 61-Col. 2, line13).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chibuike K. Nwakamma whose telephone number is 571-270-3458. The examiner can normally be reached on Mon-Thurs.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hai Tran can be reached on 5712727305. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

11/13/2007
Chibuike Nwakamma

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